

**AMENDMENTS TO CLAIMS**

1. (Canceled)
2. (Currently Amended) The method of claim 4 58, wherein said illumination is with electromagnetic radiation selected from the group consisting of infrared, visible, ultraviolet and X-ray radiation.
3. (Currently Amended) The method of claim 4 58, wherein said biochip carrier is illuminated with illumination is radiation selected from the group consisting of pulsating radiation, coherent radiation, monochromatic radiation, parallel radiation and radiation which can be focused in different planes.
4. (Currently Amended) The method of claim 4 58, wherein different said selected predetermined areas are illuminated in parallel.
5. (Currently Amended) The method of claim 4 58, wherein said illumination matrix is a reflection matrix having a controllably deformable mirror arrangement.
6. (Previously presented) The method of claim 5, wherein said reflection matrix is selected from the group consisting of a light modulator with viscoelastic control layers and a light modulator with micromechanical mirror arrays.
7. (Currently Amended) The method of claim 4 58, wherein said illumination matrix is prepared on a chip and comprises a light source selected from the group consisting of a laser array and a diode array.
8. (Currently Amended) The method of claim 4 58, wherein said biochip carrier is an optically transparent carrier.

9. (Currently Amended) The method of claim 4 58, wherein said biochip carrier has a surface selected from the group consisting of glass and plastics.

10. (Currently Amended) The method of claim 4 58, wherein said selected predetermined area is areas each are from 1  $\mu\text{m}^2$  to 1 cm<sup>2</sup>.

11. (Currently Amended) The method of claim 4 58, wherein said selected predetermined area is areas each are surrounded by nonactivated areas.

12-17. (Canceled).

18. (Currently Amended) The method of claim 4 58, wherein said illumination takes place at a rate of from 1/10000 to 1000 light patterns per second.

19-20. (Canceled)

21. (Currently Amended) The method of claim 4 58, wherein said biochip carrier is precalibrated using the illumination matrix and light sensor detection matrix.

22-26. (Canceled).

27. (Currently Amended) A The method for coating a biochip carrier with biologically or chemically functional materials which comprises: of claim 58,

(a) providing a wherein said biochip carrier having has a surface which comprises photoactivatable groups located on predetermined areas of said biochip carrier surface and wherein said programmable illumination matrix is a UV light source array comprising a plurality of individually controllable light sources; and

- (b) activating wherein said specific two-dimensional light exposure pattern activates said photoactivatable groups on-at least a said selected predetermined area areas of said biochip carrier surface-by-location-specific illumination of said predetermined area of said biochip carrier surface using said UV light source array to generate an adjustable location-specific exposure pattern;
- (c) binding materials selected from the group consisting of (1) biologically functional materials, (2) chemically functional materials, (3) building blocks for said biologically functional materials and (4) building blocks for said chemically functional materials on said predetermined areas of said biochip carrier surface; and
- (d) repeating the activating and binding steps on the same or different predetermined areas of said biochip carrier surface.

28-36. (Canceled).

37. (Currently Amended) The method of claim 27, wherein said which further comprises binding biologically or chemically functional materials react with biological substances selected from the group consisting of (1) biologically functional materials, (2) chemically functional materials, (3) building blocks for said biologically functional materials and (4) building blocks for said chemically functional materials to said activated groups on said selected predetermined areas of said biochip carrier surface.

38. (Currently Amended) The method of claim 27 37, wherein said biologically or chemically functional materials or building blocks thereof are selected from the group consisting of nucleic acids, nucleotides, oligonucleotides, nucleic acid analogs, PNA, peptides, proteins, amino acids, saccharides, cells, cell organelles, cell membrane preparations, viral particles, cell aggregates,

allergens, pathogens, pharmacological active substances and diagnostic reagents.

39. (Currently Amended) The method of claim 27 37, wherein which further comprises synthesizing said biologically or chemically functional materials are synthesized on said biochip carrier in two or more stages from monomeric or oligomeric building blocks.

40. (Currently Amended) The method of claim 27 37, wherein said biologically or chemically functional materials are a library comprising a multiplicity of different biologically or chemically functional materials.

41. (Currently Amended) The method of claim 27, wherein said activating photoactivatable groups comprises cleaving a protective group on the photoactivatable groups on said selected predetermined areas of said biochip carrier surface.

42-43. (Canceled).

44. (Currently Amended) The method of claim 27 37, which further comprises removing materials bound on the carrier.

45. (Currently Amended) The method of claim 44, wherein said removed materials or said building blocks bound on the carrier are removed in successive steps and used as building blocks for further synthesis of polymers.

46. (Currently Amended) The method of claim 1 58, wherein said light sensor detection matrix is a CCD matrix.

47. (Currently Amended) The method of claim 4 58, wherein said biochip carrier has a surface selected from the group consisting of silicon, germanium arsenide and gallium arsenide.

48. (Previously presented) The method of claim 9, wherein said glass is quartz glass.

49. (Previously presented) The method of claim 10, wherein said selected predetermined area is areas each are from 100  $\mu\text{m}^2$  to 1 mm<sup>2</sup>.

50. (Previously presented) The method of claim 18, wherein said illumination takes place at a rate of from 1/10 to 100 light patterns per second.

51-56. (Canceled).

57. (Previously presented) A method of claim 27 wherein said UV light source array is selected from the group consisting of a diode array, a UV laser array, and both a diode array and a UV laser array.

58. (New) A method of biochip manufacture, which comprises

- (a) providing a programmable illumination matrix and a light sensor detection matrix, wherein said illumination matrix and said detection matrix are arranged facing each other such that the detection matrix is situated in the light path of the illumination matrix and such that the detection matrix can detect light from the illumination matrix;
- (b) positioning a transparent biochip carrier, wherein said carrier has a surface that comprises photoactivatable groups located thereon in predetermined areas of said biochip carrier surface, between said illumination matrix and said detection matrix and in the light path of said illumination matrix such that light from the illumination matrix illuminates

and is transmitted through said biochip carrier and to said detection matrix;

- (c) specifically illuminating said biochip carrier to produce a two-dimensional light exposure pattern that illuminates selected predetermined areas of said biochip carrier;
- (d) controlling the quality of said specific illumination by detecting the location of the illumination of said two-dimensional light exposure pattern on said biochip carrier using the detection matrix; and
- (e) optionally adjusting said two-dimensional light exposure pattern.